

# PATENT SPECIFICATION



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## COMPLETE SPECIFICATION

### DRAWINGS ATTACHED

#### Belt Conveyor

I, JOHN HERBERT MCFARLANE, of 227 Sussex Street, Sydney, in the State of New South Wales, Commonwealth of Australia, a British Subject, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 The object of this invention is to provide a belt conveyor, particularly suited for the carriage of powered or granular substances; especially, food substances such as powdered milk, flour, sugar and the like.

15 Existing conveyors for such materials comprise screw conveyors, chain conveyors, bucket elevators and so on, but all of these prior conveyors have sharp corners and large numbers of structural or machine parts all of which are capable of holding accumulations of the material being conveyed, and thus create cleaning problems, and generally give rise to faulty operation.

20 By the present invention the indicated objections are avoided; and moreover, a belt conveyor is provided which enables the conveying path to be variously directed throughout its length as may be required; and which is of extremely simple and inexpensive construction.

30 According to this invention there is provided a belt conveyor comprising, a flexible flat endless belt, a pair of mounting pulleys for the belt, means for driving one or both of the pulleys; and, between the pulleys, a guide or a plurality of guides for the belt, wherein said guide or each of them consists solely of means which compel a belt portion disposed therein or passing therethrough to assume tubular form.

40 Examples of the invention are schematically illustrated in the drawings herewith.

Fig. 1 is a perspective view of a conveyor

for carrying material along a path having a 90° turn in it.

Fig. 2 is a cross section taken on line 2-2 in Fig. 1.

Fig. 3 is a fragmentary perspective view showing a filling spout entered into a belt.

Fig. 4 is a fragmentary perspective view showing belt confining means alternative to those shown in Fig. 1.

Referring to Figs. 1 and 2, the belt conveyor consists of a flexible flat endless belt 5, a portion of which (a "conveying" portion) extends through confining means comprising a stationarily mounted guide tube 6 whereof the bore is of such size that the belt portion therein is caused to assume and remain in the form of a tube which is closed or nearly closed by mutual lapping, touching, or close approach of the longitudinal edge margins of the belt. For preference the belt overlaps; thus, as shown at 7 in Fig. 2. Thus, a guide tube of plastics material such as polyvinyl chloride or of glass or metal or other material, preferably able to provide a smooth interior surface, is caused to extend along the path, or at least along any bends in that path, upon which a material is to be conveyed; the path being one which extends upwardly or downwardly or round corners or over whatever may be the most direct or convenient path from a required filling station to a required discharge station. The guide tube may be supported by being clamped, strapped or otherwise secured to building structure members, trestles, wall brackets, or the like.

The conveyor belt may be an endless band of rubber, canvas, or other flexible material. It is mounted on pulleys 8 (carried in bearings as well understood) one of which (at least) is furnished with means for driving it (also as well understood). The conveying portion of the belt extends through the guide

tube as already indicated, and its return web may pass through a similar tube 9 or about any required driving pulleys, or jockey pulleys, and direction-change pulleys where bends, corners or the like have to be negotiated.

At the filling station, material to be conveyed is placed on the belt by way of a chute, or from a hopper, or the like as indicated at 10; and at the discharge station the conveyed material may simply fall from the belt by that belt passing over the adjacent pulley 8.

If desired, a filling or discharge station may be arranged by providing a break in a guide tube 6A as shown in Fig. 3, the break being of sufficient length to enable the mutually lapped marginal portions of the belt 5A to be parted from each other an amount sufficient to enable a filler spout 11 or the like to be inserted between the margins, or to act as a parting finger which itself opens the belt sufficiently.

It will be appreciated that the conveyor belt is an ordinary flat belt while it is not travelling through a guide tube; and that when travelling through a guide tube the belt assumes full circle or near full circle internally corresponding with the guide tube by the longitudinal edges of the belt becoming abutted or only slightly spaced apart or preferably overlapping as already indicated.

If desired the conveyor belt may be transversely ribbed so to increase the frictional "bite" of the belt on materials to be conveyed uphill. Alternatively, the belt may have a number of discs or the like fixed thereto, on edge and transversely thereof, so that when the belt folds inside the guide tube it is longitudinally compartmented by the discs and or held against inward collapse or crumpling as it goes round a bend.

It will be understood that belt confining means in the form of a tube such as 6, is mainly necessary at turning points of the conveyor belt, and that at other parts, particularly straight horizontal parts, the belt may be much more loosely confined, or even allowed to run flat if the material carried is sufficiently non-flowable as not to spill from the belt. As an example, belt portions not in need of full confinement can be sent through a series of spaced apart rings 12 (Fig. 4) mounted on a stationarily supported beam or the like. The rings 12 are preferably made as large as, and therefore as loose a

fit, for the belt to go through them, as is compatible with the belt remaining able to hold its load; and, the pitch at which the rings are spaced apart is preferably such as to prevent any appreciable sag of the loaded belt between the ring supports.

It will be appreciated that vertical or uphill lifting of goods may be effected by means of a conveyor as herein described even if carrier discs or the like are not included as positive transfer means; provided, the belt portion ahead of the rise is level or downhill for such a distance that the material therein provides a back-stop column of sufficient frictional resistance to support or prevent retrograde movement of the material in the rising portion of the belt.

It will also be appreciated that where a very sharp bend is to be made (sharper than that indicated in Fig. 1) frictional resistance of a loaded belt may be too great. Hence at such bends a deeply grooved freely rotatable "bend" pulley may be provided about which a folded belt may run, without unfolding, provided confining means such as those described herein encase the belt close to the bend pulley on both the receiving and departure sides thereof.

#### WHAT I CLAIM IS:—

1. A belt conveyor comprising, a flexible flat endless belt, a pair of mounting pulleys for the belt, means for driving one or both of the pulleys; and, between the pulleys, a guide or a plurality of guides for the belt, wherein said guide or each of them consists solely of means which compel a belt portion disposed therein or passing therethrough to assume tubular form.

2. A conveyor according to claim 1 wherein said means comprises an internally smooth stationarily mounted tube.

3. A conveyor according to claim 1 wherein said means comprises a plurality of stationarily mounted spaced apart rings.

4. The belt conveyor as herein described with reference to Figs. 1 and 2, or Fig. 3 of the drawings herewith.

5. The belt conveyor as herein described with reference to Fig. 4 of the drawings herewith.

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#### PROVISIONAL SPECIFICATION

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statement:—

The object of this invention is to provide a belt conveyor, particularly suited for the carriage of powdered or granular substances; especially, food substances such as powdered

milk, flour, sugar and the like.

Existing conveyors for such materials comprise screw conveyors, chain conveyors, bucket elevators and so on, but all of these prior conveyors have small corners and large numbers of structural or machine parts all of which are capable of holding accumulations of the material being conveyed, and thus create cleaning problems, and generally give rise to faulty operation.

By the present invention the indicated objections are avoided; and moreover, a belt conveyor is provided which enables the conveying path to be variously directed throughout its length as may be required; and, which is of extremely simple and inexpensive construction.

According to this invention a conveyor consists of a flexible flat endless belt, a pair of mounting pulleys for the belt, means for rotating one of the pulleys; and, between the pulleys, confining means which compel a belt portion disposed therein or passing therethrough to assume tubular form.

In one embodiment the belt conveyor consists of a flexible flat endless belt, a portion of which (a "conveying" portion) extends through confining means comprising a stationarily mounted guide tube whereof the bore is of such size that the belt portion therein is caused to assume and remain in the form of a tube which is closed or nearly closed by mutual lapping, touching, or close approach of the longitudinal edge margins of the belt. For preference the belt overlaps; thus, a guide tube of plastics material such as polyvinyl chloride or of glass or metal or other material, preferably able to provide a smooth interior surface, is caused to extend along the path, or at least along any bends in that path, upon which a material is to be conveyed; the path being one which extends upwardly or downwardly or round corners or over whatever may be the most direct or convenient path from a required filling station to a required discharge station. The guide tube may be supported by being clamped, strapped or otherwise secured to building structure members, trestles, wall brackets, or the like.

The conveyor belt may be an endless band of rubber, canvas, or other flexible material. It is mounted on pulleys (carried in bearings as well understood) one of which (at least) is furnished with means for rotating it (also as well understood). The conveying portion of the belt extends through the guide tube as already indicated, and its return web may pass through a similar tube or about any required driving pulleys, or jockey pulleys, and direction-change pulleys where bends, corners or the like have to be negotiated.

At the filling station, material to be conveyed is placed on the belt by way of a chute, or from a hopper, or the like; and at the dis-

charge station the conveyed material may simply fall from the belt by that belt passing over the adjacent pulley.

If desired, a filling or discharge station may be arranged by providing a break in a guide tube, the break being of sufficient length to enable the mutually lapped marginal portions of the belt to be parted from each other an amount sufficient to enable a filler spout or the like to be inserted between the margins, or to act as a parting finger which itself opens the belt sufficiently.

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It will be understood that belt confining means in the form of a tube are mainly necessary at turning points of the conveyor belt, and that at other parts, particularly straight horizontal parts, the belt may be much more loosely confined, or even allowed to run flat if the material being carried is sufficiently non-flowable as not to spill from the belt. As an example, belt portions not in need of full confinement can be sent through a series of spaced apart rings mounted on a stationarily supported beam or the like. The rings are preferably made as large as, and therefore as loose a fit, for the belt to go through them, as is compatible with the belt remaining able to hold its load; and, the pitch at which the rings are spaced apart is preferably such as to prevent any appreciable sag of the loaded belt between the ring supports.

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5 those described herein encase the belt close to the bend pulley on both the receiving and

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